Miscellaneous Paper CHL-98-2
April 1998

US Army Corps of Engineers
Waterways Experiment Station

Climatic Summary for Sandy Hook Bay, New Jersey

by Margaret A. Sabol, Terri L. Prickett

Prepared for Headquarters, U.S. Army Corps of Engineers

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

PRINTED ON RECYCLED PAPER

Miscellaneous Paper CHL-98-2
April 1998

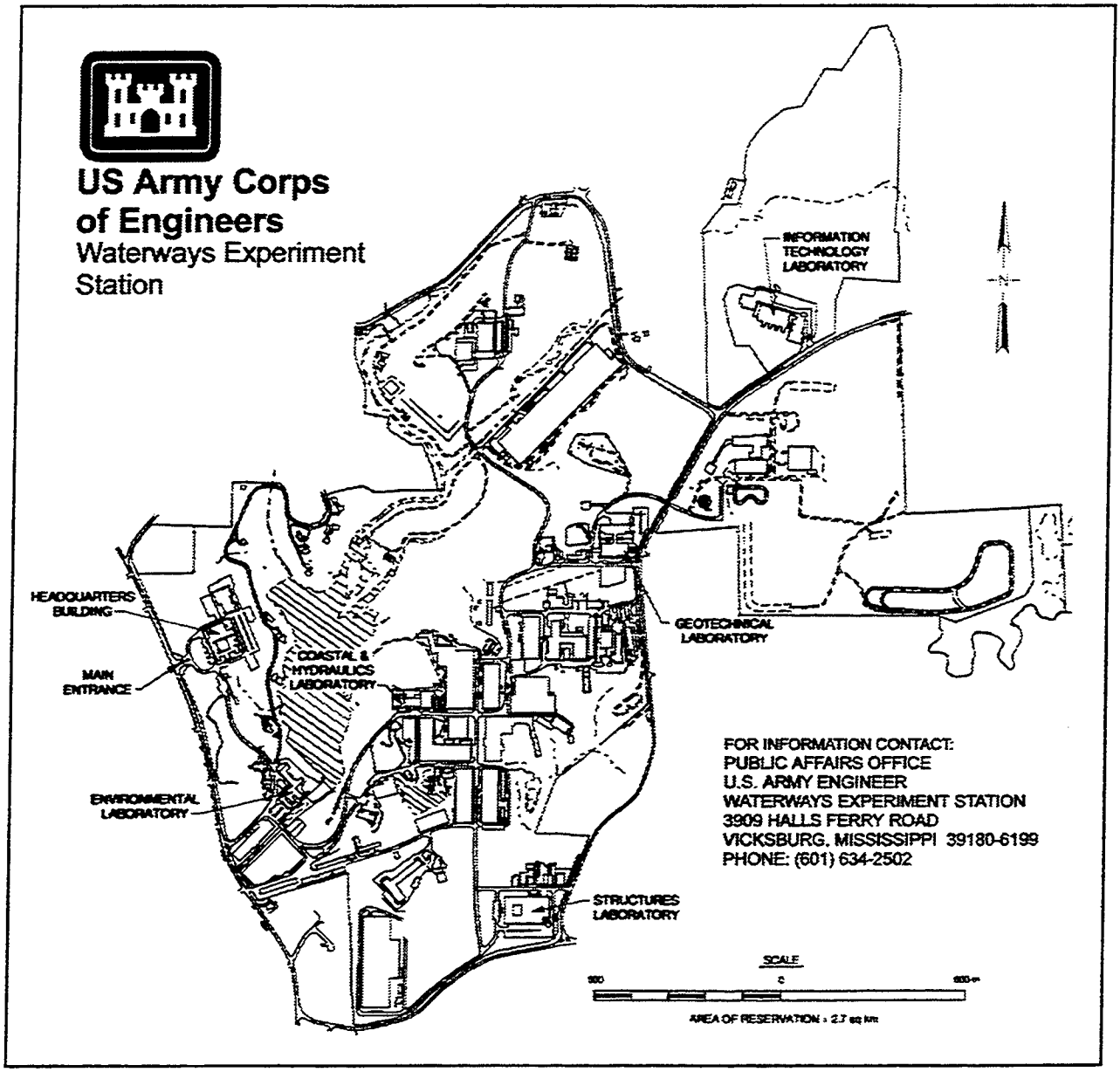
Climatic Summary for Sandy Hook Bay, New Jersey

by Margaret A. Sabol, Terri L. Prickett

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Final report

Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000



Waterways Experiment Station Cataloging-in-Publication Data

Sabol, Margaret A.

Climatic summary for Sandy Hook Bay, New Jersey / by Margaret A. Sabol, Terri L. Prickett ; prepared for U.S. Army Corps of Engineers.

35 p. : ill. ; 28 cm. — (Miscellaneous paper ; CHL-98-2)

Includes bibliographic references.

1. Ocean waves — New Jersey — Sandy Hook Bay. 2. Water waves — New Jersey —Sandy Hook Bay. 3. Wind waves — New Jersey — Sandy Hook Bay. I. Prickett, Terri L. II. United States. Army. Corps of Engineers. III. U.S. Army Engineer Waterways Experiment Station. IV. Coastal and Hydraulics Laboratory (U.S. Army Engineer Waterways Experiment Station) V. Title. VI. Series: Miscellaneous paper (U.S. Army Engineer Waterways Experiment Station) ; CHL-98-2.

TA7 W34m no.CHL-98-2

Contents

List of Figures

List of Tables

Preface

The study described herein was conducted by the U. S. Army Engineer Waterways Experiment Station (WES) Coastal and Hydraulics Laboratory (CHL). The CHL was formed in October 1996 with the merger of the WES Coastal Engineering Research Center and Hydraulics Laboratory. Dr. James R. Houston is the Director of the CHL and Mr. Charles C. Calhoun, Jr., is Assistant Director.

The objective of this data collection effort was to provide wave information to support CHL modeling efforts for the New York/New Jersey Harbor Dredged Material Management Plan Study requested by the U.S. Army Engineer District, New York. Ms.Terri L.Prickett was Principal Investigator and Ms.Margaret A. Sabol performed data analysis and prepared data products and descriptions. Mses. Prickett and Sabol were supervised by Mr. William L. Preslan, Chief, Prototype Measurement and Analysis Branch (PMAB), and Mr. Thomas W. Richardson, Chief, Coastal Sediments and Engineering Division, CHL. Ms. Christina Rasmussen, of the U.S. Army Engineer District, New York, was point of contact for project operations.

Other CHL personnel made substantial contributions to the Sandy Hook Bay data collection and analysis. Field team members included Messrs. Larry G. Caviness, Charles J. Mayers, and Ralph E. Ankeny, all of PMAB.

The data collection systems were designed by Messrs. Ankeny, William E. Grogg, Gary L. Howell, and James Rosati III, of PMAB.

Dr. Robert W. Whalin was Director of WES at the time of publication of this report. COL Robin R. Cababa, EN, was WES Commander.

1 Introduction

Background

This document summarizes Coastal and Hydraulics Laboratory (CHL), Prototype Measurement and Analysis Branch (PMAB) wave data collection activities in Sandy Hook Bay, NJ, performed in accordance with Military Interdepartmental Purchase Request Number NYD-97-18(C). The objective of this data collection effort was to provide wave information to support CHL modeling efforts for the New York/New Jersey Harbor Dredged Material Management Plan Study (DMMP) requested by the U.S. Army Engineer District, New York. Sandy Hook Bay wave data collection was accomplished using the Prototype Measurement Analysis System, which consists of coastal oceanographic sensors and instrumentation, communication equipment, and a relational database management system (described in McKinney and Howell (1996)).

2 Equipment

From March to August 1997, continuous wave measurements were collected from a near-real-time directional wave gage (DWG-1) designated as NJ002 and deployed offshore of Colts Neck, NJ, in Sandy Hook Bay (Figure 1). The gage was located approximately 1,400 m north by northeast offshore of the Bedford Harbor Jetty and 760 m due west of the Earle Naval Weapons Station pier (latitude 40.45 N and longitude 74.06 W) in about 6-m water depth. Data collection equipment included a sensor package of three piezoelectric pressure sensors mounted in an equilateral triangle distribution on a steel, trawler-resistant pod. The pressure sensors were connected to a DWG-1 located in the center of the pod. Details about the DWG-1 and its operation are found in Howell (1992). An acoustic releasing transponder was also attached to the underwater unit to locate the gage for retrieval. Once the instrumented pod was lowered to the bottom, it was secured to the seafloor with water-jetted piles. Pod orientation, necessary to determine wave direction, was then determined by divers using an underwater compass.

Data were transmitted from the underwater unit through a double-armored data logging cable, which was spooled out along the seafloor to a shoreside Remote Transmission Unit (RTU). The RTU was installed inside a building located on the Earle Naval Weapons Station pier and was equipped with a power supply, data storage components, and a modem which was used to communicate with PMAB's mainframe computer. The RTU also included a self-contained, battery backed-up buffer to store data in the event of a power failure at the site. The buffer in the RTU held approximately 36 hr of data, with the oldest data records continually overwritten by new data records.

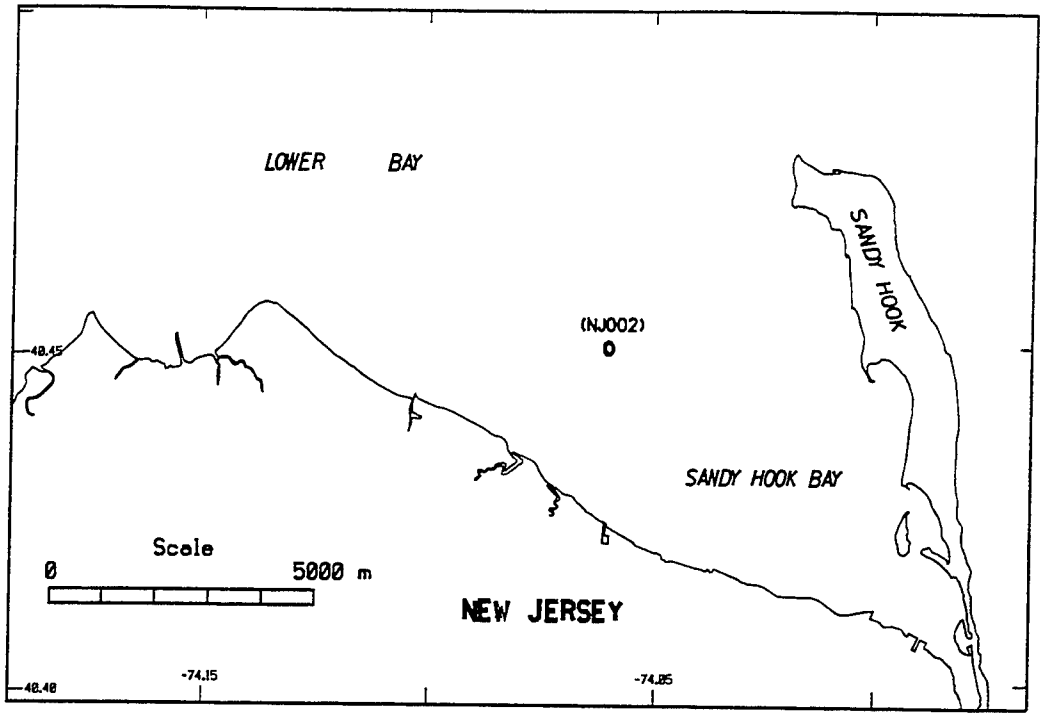


Figure 1. Wave gage location (NJ002) in Sandy Hook Bay, NJ

3 Data Collection and Analysis

Hourly data collection began in March 1997, with the DWG sampling output of the pressure sensors at 1 Hz in 1024-sec bursts (approximately 17 min). From March 11 to August 8,1997, the DWG sampled output at 2.5 Hz in 1024-sec bursts. On August 8, 1997, the data logging cable was severed during dredging activities in the bay, precluding further data collection.

Data were automatically retrieved every 4 hr by PMAB's computer. After retrieval, data analysis was initiated and performed according to standards provided in Earle, McGehee, and Tubman (1995). In addition to on-board-instrument numerical quality control procedures, plots of pressure time series and directional wave spectra were visually inspected on a daily basis. Detailed wave information was provided directly to CHL modelers as the work progressed. At the end of each month, monthly wave data summary plots and tables consisting of wave height, period, and direction were generated and stored in separate databases (Corson and Sabol 1996). The tabulated wave data are also available for public access on the Internet at:

http://sandbar.cerc.wes.army.mil

The Sandy Hook wave gaging site is designated as NJ002. Instructions for downloading are provided on the website.

4 Description of Products

Monthly wave data summary plots and tables of wave height, period, and direction from March through August 1997 are reported in this document. These parameters are derived from a two-dimensional power density spectrum of the sea surface using spectral analysis of the sensors' output and linear wave theory. The parameters are defined as follows (see the *Shore Protection Manual* (1984) for additional information):

a. Wave height H_{m0}: Spectrally derived wave height, in meters; equivalent to time-domain-derived significant wave height in deep water.

b. Wave period T_p: Peak spectral period, in seconds; inverse of the frequency of the peak (highest energy) of the one-dimensional power spectrum.

c. Wave direction D_p: Peak spectral direction, in degrees clockwise from true north; mean direction from which energy is coming at the peak of the one-dimensional power spectrum.

d. Energy spectra: Directional wave spectra in meters squared per hertz; wave elevation variance as a function of wave direction and wave frequency. In this report, direction per frequency interval reported is the mean direction of the frequency interval.

Missing data are excluded from the summaries.

Six data summary products are provided:

a. Number of records.
b. Mean/max wave height.
c. Percent occurrence.
d. Wave rose plots.
e. Spectral density plots.
f. Monthly time series plots.

Descriptions and examples of each type of product are presented in the following sections of the report.

Number of Records

Table 1 provides a monthly count of the number of records in each of three categories: records that have an H_{m0}, those that have an H_{m0} and T_p, and those that have an H_{m0}, T_p, and D_p. Table 1 indicates that for all months of the gage deployment at Sandy Hook, NJ, all records collected produced H_{m0}, T_p, and D_p.

Table 1
Number of Sandy Hook Bay, NJ, Wave Data Records

Month	Number of Records		
	H_{m0}	H_{m0} and T_p	H_{m0}, T_p, and D_p
March	669	669	669
April	603	603	603
May	705	705	705
June	701	701	701
July	425	425	425
August	91	91	91
Total	3194	3194	3194

Mean/Maximum Wave Height

Mean and maximum H_{m0} values by month, are provided in Table 2. The largest monthly H_{m0} was 1.4 m. It occurred at 1200 hr Universal Coordinated Time (UTC) on March 6, with an associated T_p of 4.1 sec and D_p of 309 deg (Table 3).

Table 3 gives deployment (March through August 1997) statistics of:

a. Mean T_p (in seconds).
b. Most frequent 22.5-deg direction band (in degrees azimuth).
c. Standard deviation of H_{m0} and T_p.
d. Largest H_{m0} along with its associated T_p, D_p , and the date of the occurrence.

Directional bands are centered on 22.5-deg increments such as 0, 22.5, 45, etc.

Percent Occurrence

Percent occurrence tables indicate the percent of the total number of records for Sandy Hook Bay, NJ, that have a specified H_{m0} and T_p. Two types of percent occurrence tables are provided for NJ002: azimuth tables and tables for all directions. The azimuth tables give the percent occurrence by height and period

of waves within a particular azimuth band. Height bands are 0.25-m increments; period bands are 10 uneven increments from below 3.0 sec to above 12.8 sec. (Table 4). Azimuth bands are centered on 22.5-deg increments such as 0, 22.5, 45 etc. (Table 5). Table 6 consists of azimuth tables for each 22.5-deg increment.

Table 2
Monthly Mean/Maximum Wave Height (H_{m0}) for Sandy Hook Bay, NJ

Month	Mean H_{m0} m	Maximum H_{m0} m
March	0.2	1.4
April	0.2	1.3
May	0.2	0.9
June	0.1	0.6
July	0.1	0.5
August	0.1	0.1

Table 3
Sandy Hook Bay, NJ, Wave Statistics (March through August,1997)

Mean significant wave height (m)	0.2
Mean peak wave period (sec)	7.6
Most frequent 22.5 (center) direction band (degrees)	45.0
Standard deviation of H_{m0}	0.2
Standard deviation of T_P	4.0
Largest H_{m0} (m)	1.4
T_P (sec) associated with the largest H_{m0}	4.1
Peak direction (degrees) associated with the largest H_{m0}	309.0
Date and time of largest H_{m0} occurrence	970306, 1200 UTC

All percent values shown in Table 6 are percent multiplied times 1,000 to provide for greater readability with preservation of accuracy. Totals of the height category are provided at the right of each height row. Totals for each period range are at the bottom of each period column. Results are in summary form at the bottom of each tabulation showing the mean H_{m0} and T_p, the largest H_{m0} , and the number of cases included in that particular azimuth band.

Table 4
Frequency Ranges for Percent Occurrence Tables

Midband		Band Range for Period sec	Grouping for Percent Occurrence Tables Period, sec
Frequency	Period sec		
0.396 . . 0.337	2.53 . . 2.97	2.51 ≤ *Tp* < 2.54 . . 2.95 ≤ *Tp* < 2.99	< 3.0
0.332 . . 0.254	3.01 . . 3.94	2.99 ≤ *Tp* < 3.03 . . 3.90 ≤ *Tp* < 3.98	3.0 - 3.9
0.249 . . 0.200	4.02 . . 5.00	3.98 ≤ *Tp* < 4.06 . . 4.94 ≤ *Tp* < 5.06	4.0 - 5.0
0.195 . . 0.166	5.13 . . 6.02	5.06 ≤ *Tp* < 5.19 . . 5.94 ≤ *Tp* < 6.11	5.1 - 6.1
0.161 . . 0.142	6.21 . . 7.04	6.12 ≤ *Tp* < 6.31 . . 6.92 ≤ *Tp* < 7.16	6.2 - 7.1
0.137 . 0.122	7.30 . 8.20	7.17 ≤ *Tp* < 7.43 . 8.04 ≤ *Tp* < 8.36	7.2 - 8.4
0.117 0.112	8.55 8.93	8.37 ≤ *Tp* < 8.73 8.74 ≤ *Tp* < 9.13	8.5 - 9.2
0.107 . 0.098	9.35 . 10.21	9.14 ≤ *Tp* < 9.56 . 9.96≤ *Tp* < 10.46	9.3 - 10.6
0.093 . 0.083	10.75 . 12.05	10.47 ≤ *Tp* < 11.04 . 11.70 ≤ *Tp* < 12.41	10.7 - 12.7
0.078 . . 0.005	12.82 . . 200.00	12.43 ≤ *Tp* < 13.23 . . 134.38≤ *Tp* < 390.84	12.8 - longer

Table 7 provides the percent (multiplied times 100) of waves by heights and period occurrences irrespective of direction. Each listed percent value reflects the percent occurrence of waves at a particular H_{m0} and T_p compared to all waves for which H_{m0} was computed. Totals are presented in the same line and column as in the azimuth-based tabulations. The summary line appears at the bottom, with mean H_{m0} and T_p, largest H_{m0} , and total number of cases represented by the table.

Table 5
Ranges for Direction Intervals in Percent Occurrence Tables

Midband[1] deg	Range deg
0.0	348.75 ≤ Dp < 11.25
22.5	11.25 ≤ Dp < 33.75
45.0	33.75 ≤ Dp < 56.25
67.5	56.25 ≤ Dp < 78.75
90.0	78.75 ≤ Dp < 101.25
112.5	101.25 ≤ Dp < 123.75
135.0	123.75 ≤ Dp < 146.25
157.5	146.25 ≤ Dp < 168.75
180.0	168.75 ≤ Dp < 191.25
202.5	194.25 ≤ Dp < 213.75
225.0	213.75 ≤ Dp < 236.25
247.5	236.25 ≤ Dp < 258.75
270.0	258.75 ≤ Dp < 281.25
292.5	281.25 ≤ Dp < 303.75
315.0	303.75 ≤ Dp < 326.25
337.5	326.25 ≤ Dp < 348.75

[1] From true north.

In order to determine what percent of the wave records at NJ002, Sandy Hook, NJ, occur, for example, from 304-to 326-deg azimuth with an H_{m0} of 0.75 to 0.99 m with a T_p of 3.0 to 3.9 sec, look at the percent occurrence tabulation for that azimuth band (315) (Table 6, Sheet 8 of 8). The value 313 is found where the 0.75- to 0.99- m height row intersects with the 3.0- to 3.9- sec period column. Divide this number by 1000 to get the percent. Thus, you could expect 0.75 to 0.99 m, 3.0- to 3.9- sec waves from approximately 315 deg about 0.31 percent of the time.

Table 6
Percent Occurrence for Sandy Hook Bay, NJ (NJ002) (Azimuth Tables)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 0.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	469	688	31	.	.	.	.	.	.	.	1188
0.25-0.49	281	219	.	.	.	.	.	.	.	.	500
0.50-0.74	.	469	.	.	.	.	.	.	.	.	469
0.75-0.99	.	250	.	.	.	.	.	.	.	.	250
1.00-1.24	.	31	.	.	.	.	.	.	.	.	31
1.25-1.49	.	.	31	.	.	.	.	.	.	.	31
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	750	1657	62	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.36 LARGEST Hm0 (M) = 1.25 MEAN TP (SEC) = 3.13 NO. OF CASES = 79.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 22.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	438	1784	375	.	.	62	.	93	93	814	3659
0.25-0.49	125	469	.	.	.	.	.	.	.	.	594
0.50-0.74	31	187	.	.	.	.	.	.	.	.	218
0.75-0.99	.	125	31	.	.	.	.	.	.	.	156
1.00-1.24	.	93	187	.	.	.	.	.	.	.	280
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	594	2658	593	0	0	62	0	93	93	814	

MEAN Hm0 (M) = 0.24 LARGEST Hm0 (M) = 1.18 MEAN TP (SEC) = 5.67 NO. OF CASES = 157.

(Sheet 1 of 8)

Table 6 (Continued)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 45.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	594	4414	688	1847	3350	6887	8860	11959	9768	10989	59356
0.25-0.49	62	1189	.	93	281	469	469	532	720	62	3877
0.50-0.74	.	125	.	.	.	.	.	.	.	.	125
0.75-0.99	.	93	93	.	.	.	.	.	.	.	186
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	656	5821	781	1940	3631	7356	9329	12491	10488	11051	

MEAN Hm0 (M) = 0.13 LARGEST Hm0 (M) = 0.99 MEAN TP (SEC) = 9.42 NO. OF CASES = 2030.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 67.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	375	3412	814	1158	1001	688	876	375	407	907	10013
0.25-0.49	125	469	31	31	62	31	31	.	31	.	811
0.50-0.74	.	125	.	.	.	.	.	.	.	.	125
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	500	4006	845	1189	1063	719	907	375	438	907	

MEAN Hm0 (M) = 0.13 LARGEST Hm0 (M)= 0.55 MEAN TP (SEC)= 6.27 NO. OF CASES = 350.

(Sheet 2 of 8)

Table 6 (Continued)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 90.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	156	500	156	.	.	.	.	.	.	.	812
0.25-0.49	.	.	.	.	.	.	.	.	.	.	0
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	156	500	156	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.09 LARGEST Hm0 (M) = 0.14 MEAN TP (SEC)= 3.34 NO. OF CASES = 26.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 112.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	125	31	.	.	.	.	.	.	.	156
0.25-0.49	.	31	.	.	.	.	.	.	.	.	31
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	0	156	31	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.15 LARGEST Hm0 (M) = 0.34 MEAN TP (SEC) = 3.25 NO. OF CASES = 6.

(Sheet 3 of 8)

Table 6 (Continued)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 135.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	313	31	.	.	.	.	.	.	.	344
0.25-0.49	62	.	.	.	.	.	.	.	.	.	62
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	62	313	31	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.16 LARGEST Hm0 (M) = 0.33 MEAN TP (SEC) = 3.31 NO. OF CASES = 13.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 157.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	93	.	.	.	.	.	.	.	.	93
0.25-0.49	31	.	.	.	.	.	.	.	.	.	31
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	31	93	0	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.15 LARGEST Hm0 (M)= 0.27 MEAN TP (SEC) = 3.28 NO. OF CASES= 4.

(Sheet 4 of 8)

Table 6 (Continued)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 180.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	31	.	.	.	.	.	.	.	.	31
0.25-0.49	.	.	.	.	.	.	.	.	.	.	0
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	0	31	0	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.06 LARGEST Hm0 (M) = 0.06 MEAN TP (SEC) = 3.40 NO. OF CASES = 1.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 202.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	.	.	.	.	.	.	.	.	.	0
0.25-0.49	.	.	.	.	.	.	.	.	.	.	0
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	31	93	0	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.00 LARGEST Hm0 (M)= 0.00 MEAN TP (SEC) = 0.00 NO. OF CASES = 0.

(Sheet 5 of 8)

Table 6 (Continued)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 225.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	31	62	.	.	.	.	.	.	.	.	93
0.25-0.49	.	.	.	.	.	.	.	.	.	.	0
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	31	62	0	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.13 LARGEST Hm0 (M) = 0.23 MEAN TP (SEC) = 3.20 NO. OF CASES = 3.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 247.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	500	31	.	.	.	.	.	.	.	531
0.25-0.49	31	.	.	.	.	.	.	.	.	.	31
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	31	500	31	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.11 LARGEST Hm0 (M) = 0.25 MEAN TP (SEC) = 3.36 NO. OF CASES = 18.

(Sheet 6 of 8)

Table 6 (Continued)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 270.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	250	.	.	.	.	.	.	.	.	250
0.25-0.49	.	.	.	.	.	.	.	.	.	.	0
0.50-0.74	.	.	.	.	.	.	.	.	.	.	0
0.75-0.99	.	.	.	.	.	.	.	.	.	.	0
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	0	250	0	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.10 LARGEST Hm0 (M) = 0.11 MEAN TP (SEC) = 3.20 NO. OF CASES = 8.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 292.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	.	375	.	.	.	.	.	.	.	.	375
0.25-0.49	62	500	.	.	.	.	.	.	.	.	562
0.50-0.74	.	187	.	.	.	.	.	.	.	.	187
0.75-0.99	.	31	.	.	.	.	.	.	.	.	31
1.00-1.24	.	.	.	.	.	.	.	.	.	.	0
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	62	1093	0	0	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.35 LARGEST Hm0 (M) = 0.76 MEAN TP (SEC) = 3.15 NO. OF CASES = 37.

(Sheet 7 of 8)

Table 6 (Concluded)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 315.0
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-	3.0-	4.0-	5.1-	6.2-	7.2-	8.5-	9.3-	10.7-	12.8-	
		3.9	5.0	6.1	7.1	8.4	9.2	10.6	12.7	LONGER	
0.00-0.24	1440	2035	.	31	.	.	.	.	.	.	3506
0.25-0.49	1001	2817	.	.	.	.	.	.	.	.	3818
0.50-0.74	156	1189	.	.	.	.	.	.	.	.	1345
0.75-0.99	31	313	31	.	.	.	.	.	.	.	375
1.00-1.24	.	31	31	.	.	.	.	.	.	.	62
1.25-1.49	.	.	31	.	.	.	.	.	.	.	31
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	2628	6385	93	31	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.35 LARGEST Hm0 (M) = 1.40 MEAN TP (SEC) = 3.13 NO. OF CASES = 292.

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W AZIMUTH (DEGREES) = 337.5
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-	3.0-	4.0-	5.1-	6.2-	7.2-	8.5-	9.3-	10.7-	12.8-	
	3.0	3.9	5.0	6.1	7.1	8.4	9.2	10.6	12.7	LONGER	
0.00-0.24	845	1346	125	31	.	.	.	.	.	.	2347
0.25-0.49	344	500	.	.	.	.	.	.	.	.	844
0.50-0.74	156	1314	.	.	.	.	.	.	.	.	1470
0.75-0.99	.	626	.	.	.	.	.	.	.	.	626
1.00-1.24	.	31	.	.	.	.	.	.	.	.	31
1.25-1.49	.	.	.	.	.	.	.	.	.	.	0
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1345	3817	125	31	0	0	0	0	0	0	

MEAN Hm0 (M) = 0.39 LARGEST Hm0 (M) = 1.06 MEAN TP (SEC) = 3.21 NO. OF CASES = 170.

(Sheet 8 of 8)

Table 7
Percent Occurrence for Sandy Hook Bay, NJ (NJ002)
(For All Directions)

SANDY HOOK BAY, NJ (NJ002) 40.45N 74.06W FOR ALL DIRECTIONS
MARCH - AUGUST 1997
PERCENT OCCURRENCE (X100) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT (METERS)	PEAK PERIOD (SECONDS)										TOTAL
	SHORTER-3.0	3.0-3.9	4.0-5.0	5.1-6.1	6.2-7.1	7.2-8.4	8.5-9.2	9.3-10.6	10.7-12.7	12.8-LONGER	
0.00-0.24	435	1593	228	306	435	763	973	1242	1026	1271	8272
0.25-0.49	212	619	3	12	34	50	50	53	75	6	1114
0.50-0.74	34	360	.	.	.	.	.	.	.	.	394
0.75-0.99	3	144	15	.	.	.	.	.	.	.	162
1.00-1.24	.	18	21	.	.	.	.	.	.	.	39
1.25-1.49	.	.	6	.	.	.	.	.	.	.	6
1.50-1.74	.	.	.	.	.	.	.	.	.	.	0
1.75-1.99	.	.	.	.	.	.	.	.	.	.	0
2.00-2.24	.	.	.	.	.	.	.	.	.	.	0
2.25-2.49	.	.	.	.	.	.	.	.	.	.	0
2.5+	.	.	.	.	.	.	.	.	.	.	
TOTAL	684	2734	273	318	469	813	1023	1295	1101	1277	

MEAN Hm0 (M) = 0.17 LARGEST Hm0 (M) = 1.40 MEAN TP (SEC) = 7.61 NO. OF CASES = 3194.

Wave Rose Diagram

Figure 2 is a wave rose diagram indicating mean H_{m0} and the compass direction from which the waves are coming. The scale of the rose is set so the outer edge will be as large as the largest mean wave height for this location. Three evenly spaced concentric circles within the rose delineate lesser mean wave heights. The value indicated by the circles is differentiated through the use of distinct line types. The directional bands are centered on 22.5-deg increments such as 0, 22.5, 45, etc. Mean H_{m0} and percent of samples for each direction band are represented in the wedge-shaped portions of the rose plot. The length (or radius) of the wedge describes the mean H_{m0} while the shading of the wedge tells what percent of the samples comes from that direction.

The wave rose diagram for NJ002 (Figure 2) indicates a mean H_{m0} of 0.39 m for the azimuth band centered on 337.5 deg; and for the deployment period, more than 15 percent (actually 63.6 percent, see Table 6) of the D_p values are within the 45-deg azimuth band.

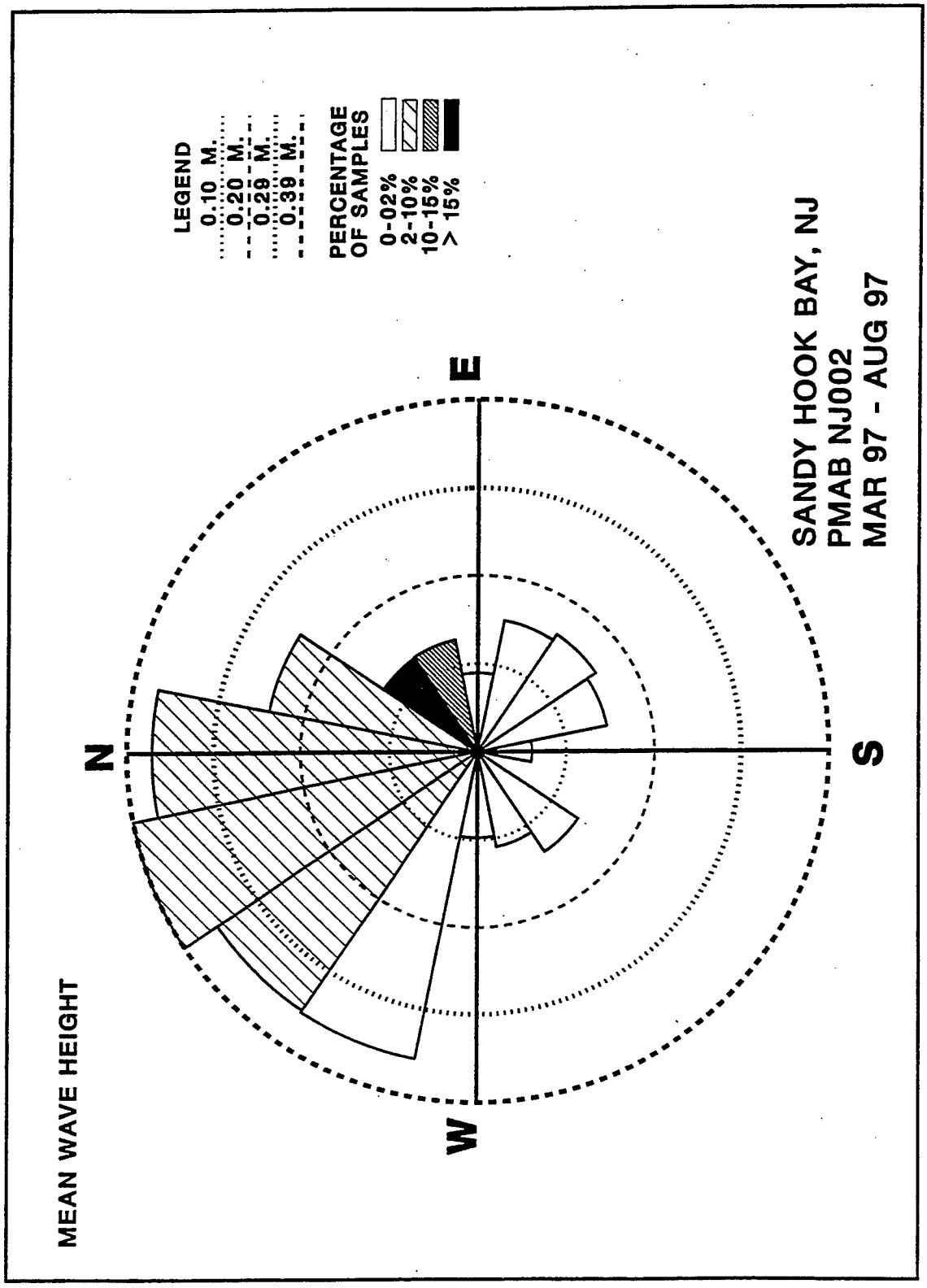


Figure 2. Wave rose for Sandy Hook Bay, NJ (NJ002)

Spectral Density

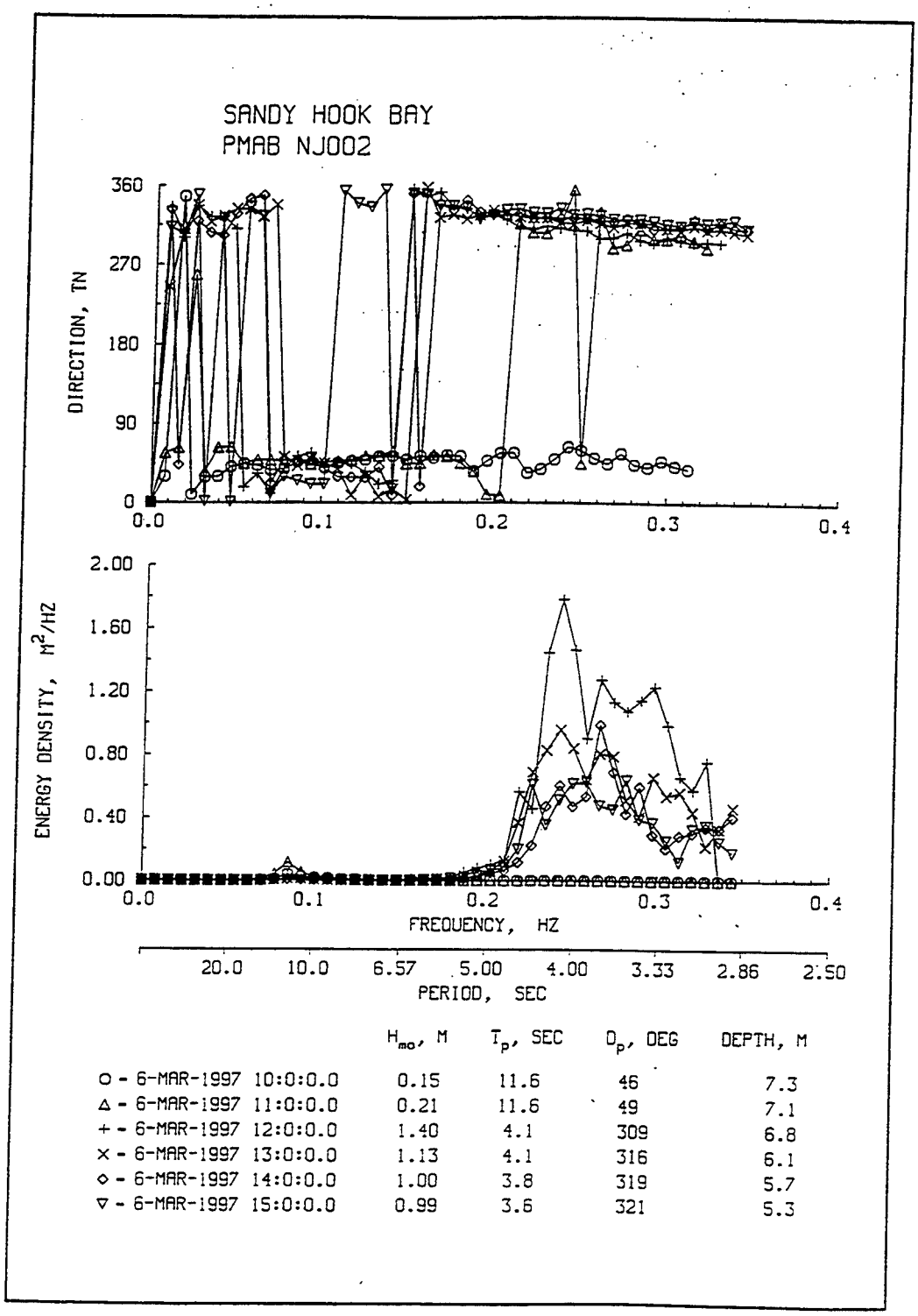
Figure 3 is a spectral density plot for data received around the time of the maximum H_{m0} for the deployment period, and shows energy density (m^2/Hz) on the y-axis and frequency (Hz) on the x-axis. A secondary axis indicating wave period (seconds) appears below the x-axis to allow rapid approximate conversion from frequency to period. Six data records are graphed in Figure 3, two records before the maximum H_{m0}, the maximum itself, and three data records after. Each data rec is plotted with a unique symbol at the coordinate locations. Symbols are con d with straight lines. The second plot above the energy density plot in Figur shows the computed direction (from true north) associated with each plotted frequency. Marking symbols match those used in the energy density plot. Wide shifts in the direction values between adjacent frequency bins may be due to very low energy values which make it difficult to assign valid directions. Energy density and direction plots are stacked on the page to allow the reader to determine the direction associated with each energy density reading. For display purposes, spectral plots for NJ002 are limited to values calculated for wave energy of 2.86 sec and above, up to 30 sec. The six data records that appear graphically are listed at the bottom of the page along with their associated symbol, time stamp (UTC), H_{m0} (m), T_p (sec), D_p (deg), and depth (m).

Figure 3 shows that the six records plotted are from 6 March 1997 from 10:00 through 15:00 UTC. The greatest amount of area exists under the curve for the 12:00 record with an H_{m0} of 1.4 m. The peak energy occurred in waves with a T_p of 4.1 sec coming from 309 deg. The depth at that time was 6.8 m.

Monthly Time Series

Figures 4 through 9 are time series plots indicating wave information collected for NJ002. The plots consist of three separate sets of axes showing H_{m0}, T_p, and D_p for a calendar month. The plots of H_{m0} and T_p show the individual readings connected by a line. The lines are continuous as long as the data were received hourly. The line appears broken if there is one or more missed data points. For H_{m0} and T_p, isolated points of data appear as individual symbols. The plot of D_p shows individual readings designated with a plus (+) symbol instead of a continuous line.

During July 1997, NJ002 recorded a long-period wave of 204.8 sec that appears as a "spike" in the monthly plot of wave period. A review of the sensor time series indicated that the data are valid. The origin of the long-period wave is not known.



	H_{mo}, M	T_p, SEC	D_p, DEG	DEPTH, M
○ - 6-MAR-1997 10:0:0.0	0.15	11.6	46	7.3
△ - 6-MAR-1997 11:0:0.0	0.21	11.6	49	7.1
+ - 6-MAR-1997 12:0:0.0	1.40	4.1	309	6.8
× - 6-MAR-1997 13:0:0.0	1.13	4.1	316	6.1
◇ - 6-MAR-1997 14:0:0.0	1.00	3.8	319	5.7
▽ - 6-MAR-1997 15:0:0.0	0.99	3.6	321	5.3

Figure 3. Spectral density plot for Sandy Hook Bay, NJ (NJ002)

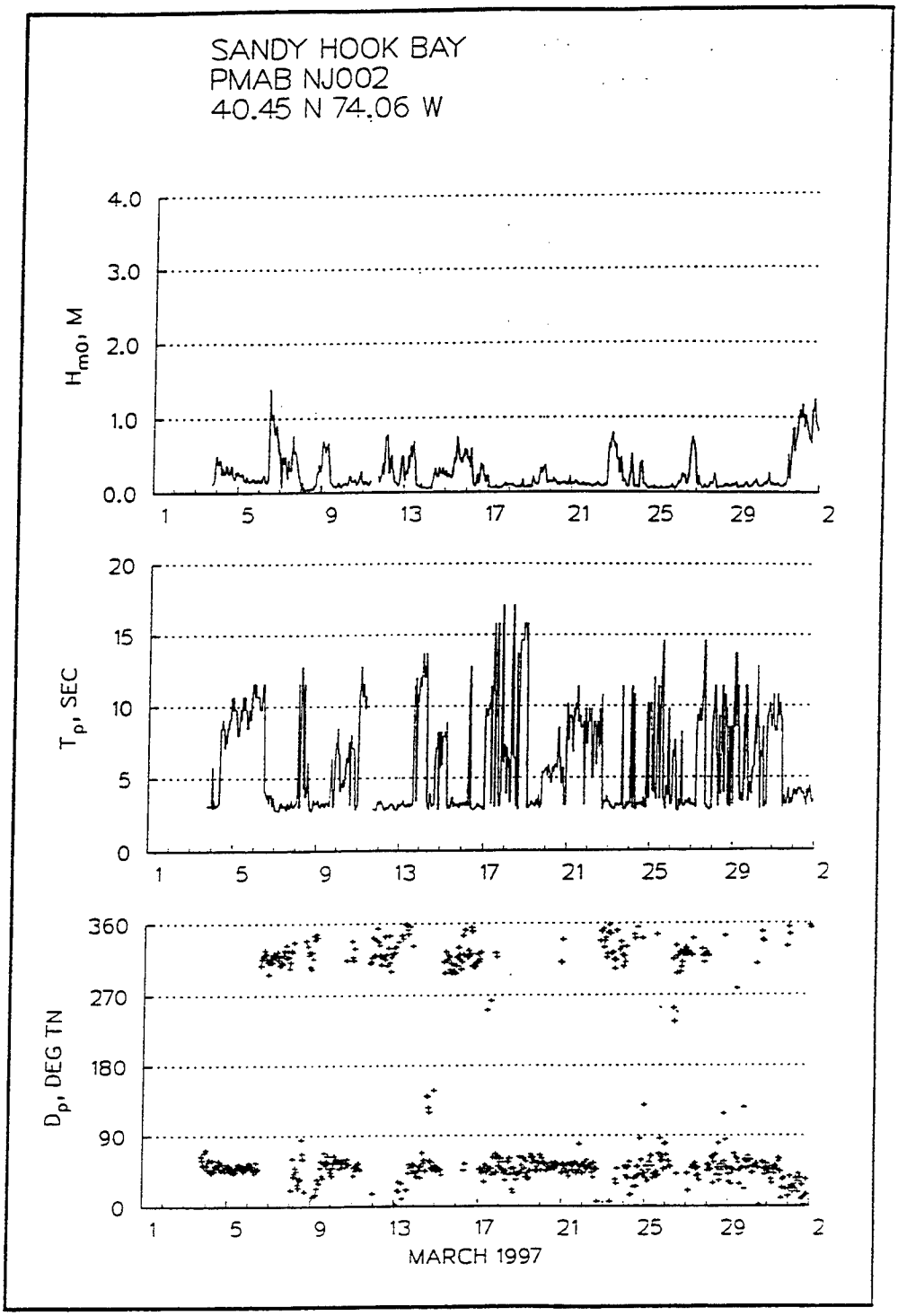


Figure 4. March 1997 monthly time series for Sandy Hook Bay, NJ (NJ002)

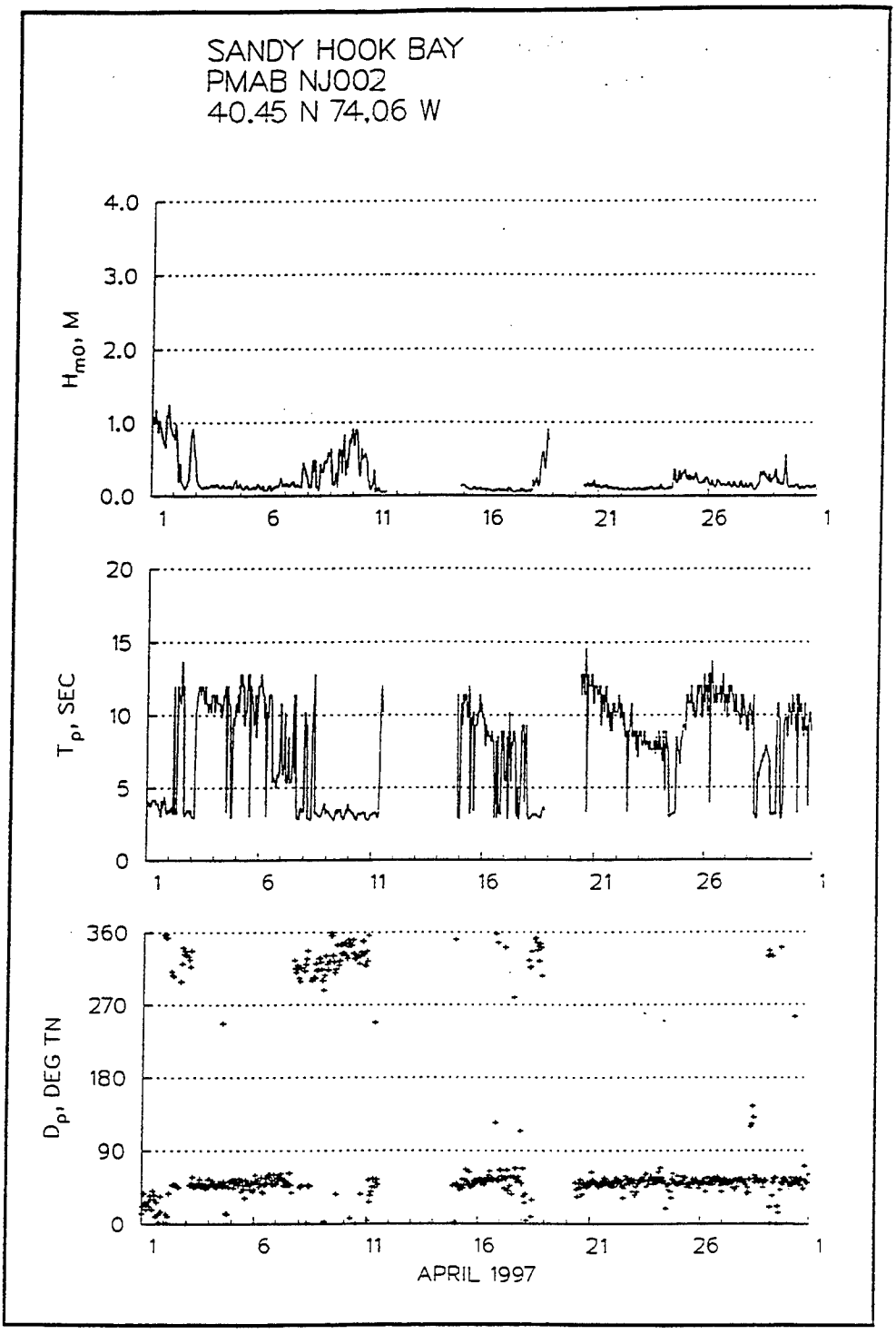


Figure 5. April 1997 monthly time series for Sandy Hook Bay, NJ (NJ002)

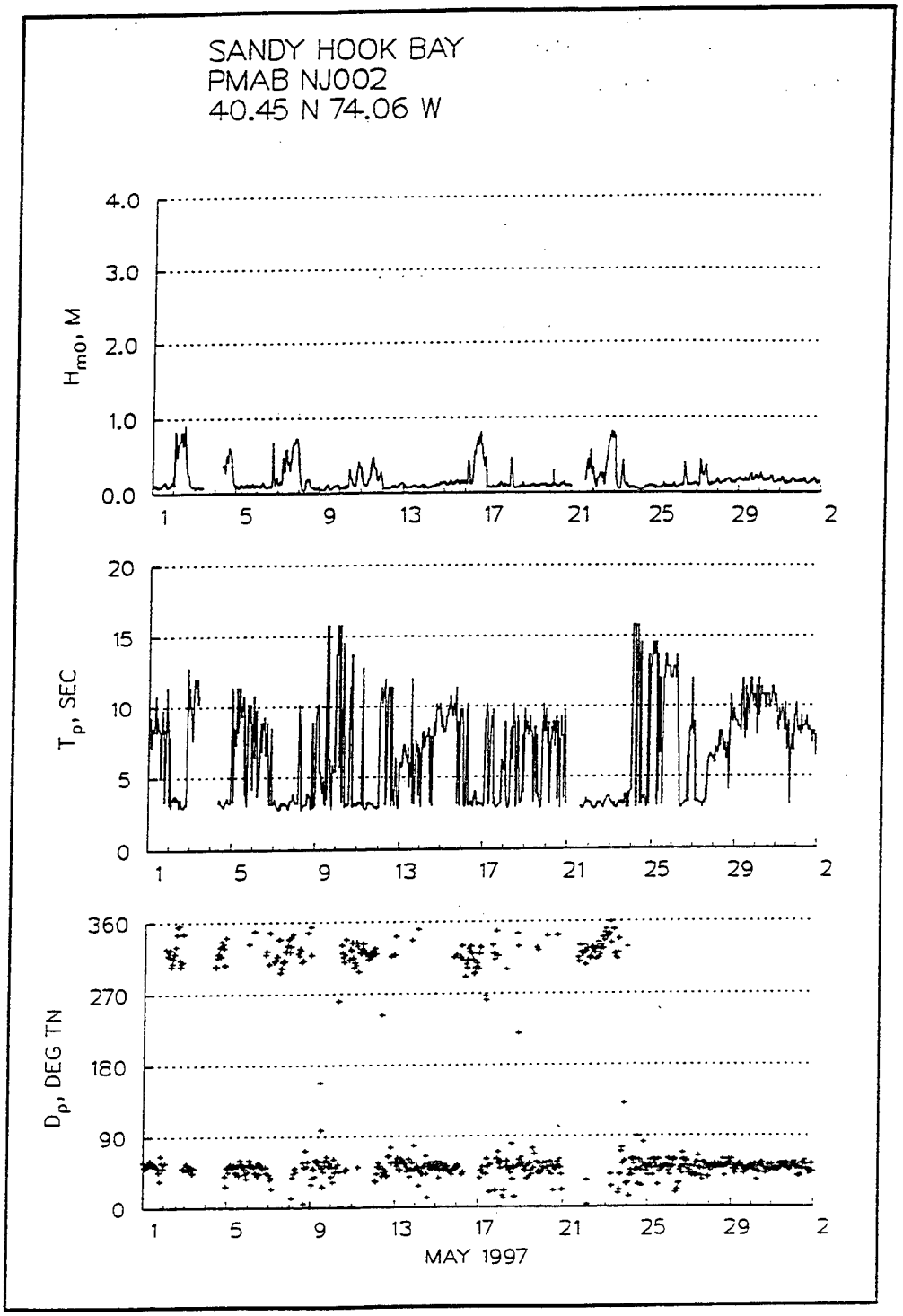


Figure 6. May 1997 monthly time series for Sandy Hook Bay, NJ (NJ002)

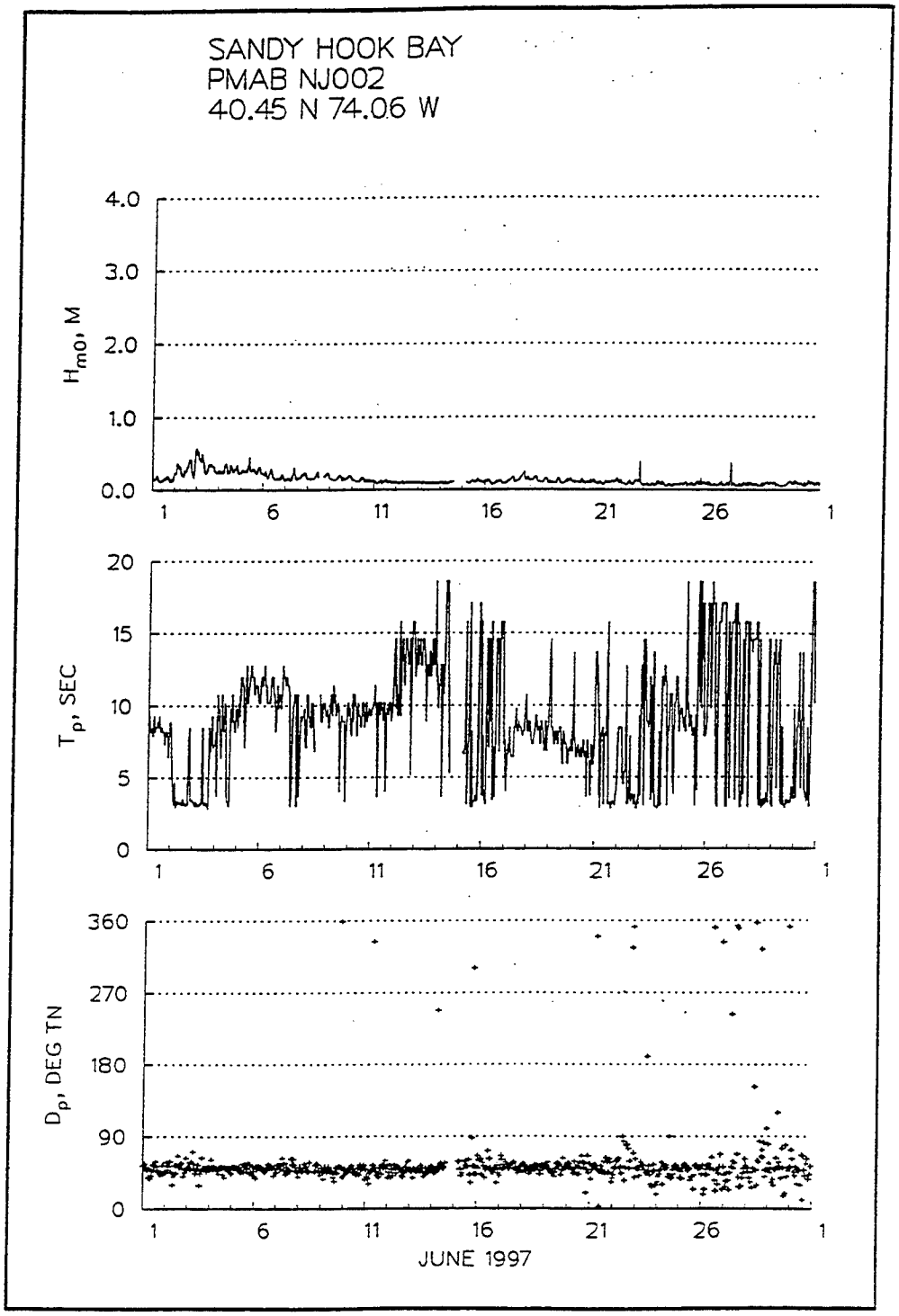


Figure 7. June 1997 monthly time series for Sandy Hook Bay, NJ (NJ002)

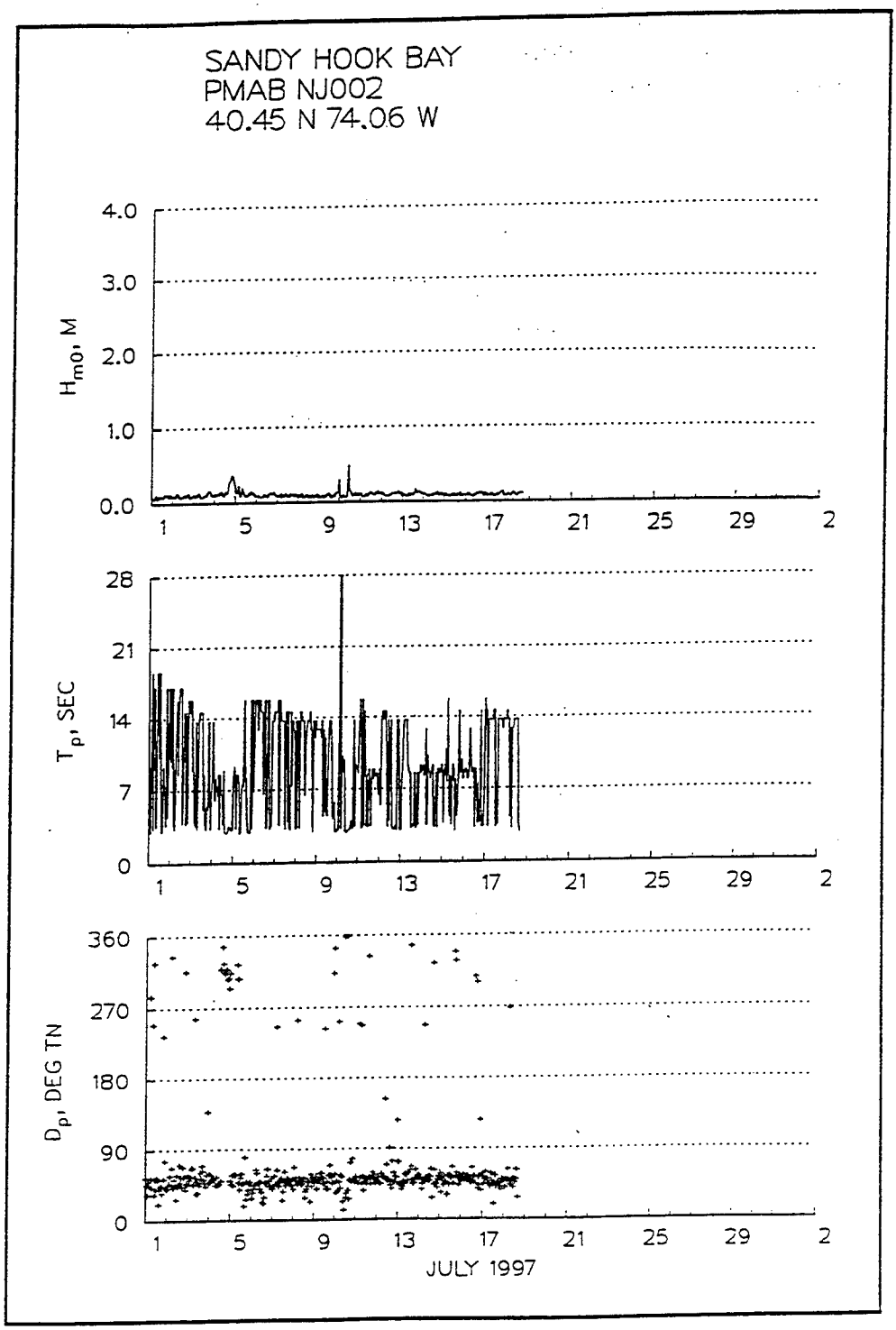


Figure 8. July 1997 monthly time series for Sandy Hook Bay, NJ (NJ002)

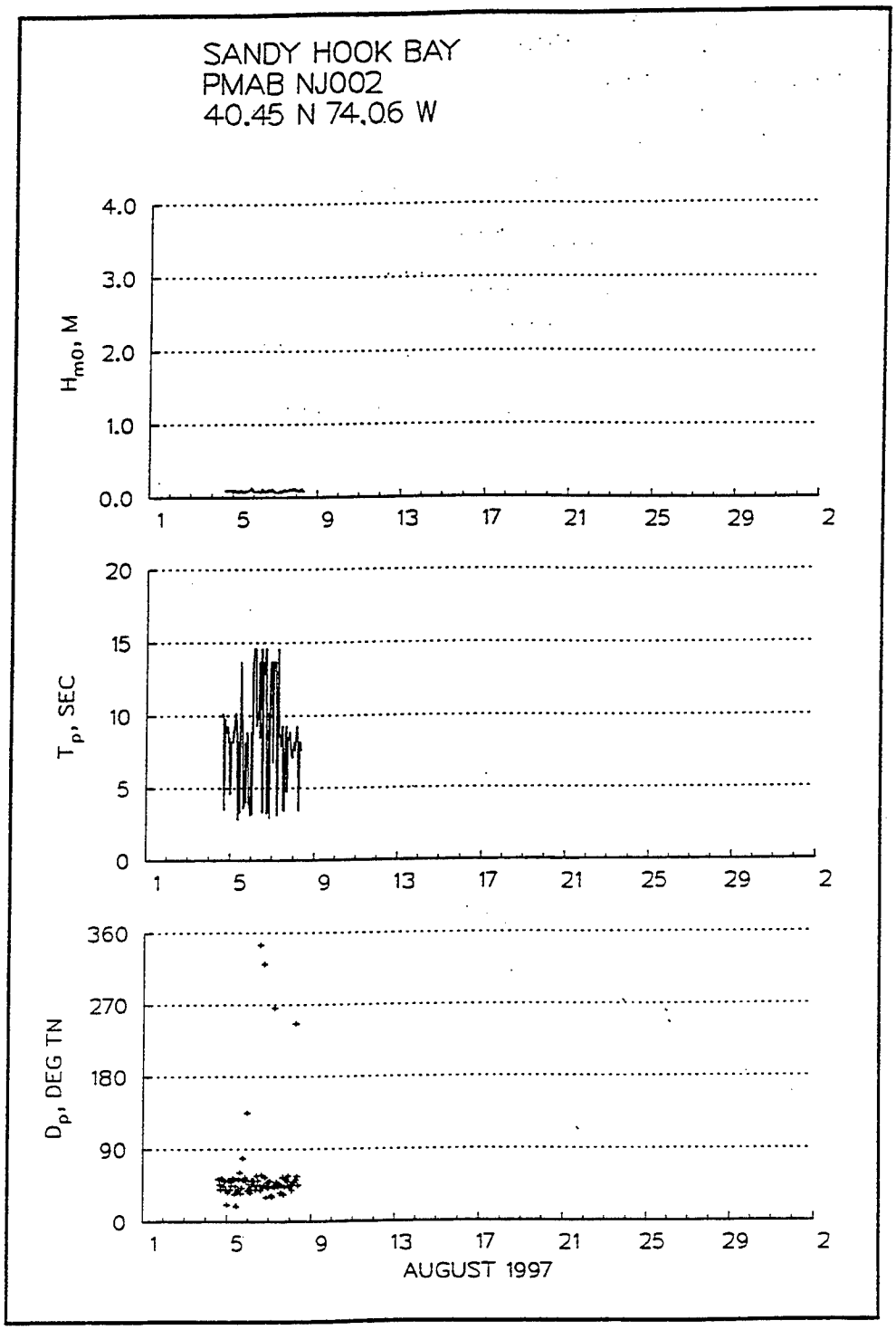


Figure 9. August 1997 monthly time series for Sandy Hook Bay, NJ (NJ002)

5 Summary

Wave data collected from NJ002 will be used to provide wave information to support CHL modeling efforts for the New York/New Jersey Harbor DMMP study requested by the U. S. Army Engineer District, New York. During the 6-month deployment period, 3,194 data records were produced, all of which passed standardized quality control checks. These data were obtained from an area that is naturally sheltered, resulting in an average H_{m0} of 0.2 m. The majority of the waves came from 34 to 56 deg although the largest H_{m0} came from 309 deg.

Questions or comments concerning the data summarized in this report may be addressed to:

U.S. Army Engineer Waterways Experiment Station
ATTN: CEWES-CC-P (Ms.Margaret Sabol)
3909 Halls Ferry Rd.
Vicksburg, MS 39180 39180-6199

email: m.sabol@cerc.wes.army.mil

References

Corson, W. D. and Sabol, M. A. (1996). "Near-real-time coastal oceanographic data products." *Proceedings, Oceans '96.* Fort Lauderdale, Florida, 790-793.

Earle, M.D., McGehee, D.D., and Tubman, M. (1995). "Field wave gaging program wave data analysis standard," Instruction Report CERC-95-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Howell, G. L. (1992). "A new nearshore directional wave gage." *Proceedings, 23rd International Conference on Coastal Engineering.* American Society of Civil Engineers, Venice, Italy, 295-307.

McKinney, J. P., and Howell, G. L. (1996). " A data acquisition and analysis system for coastal ocean measurements." *Proceedings, Oceans '96.* Fort Lauderdale, Florida, 560-564.

Shore Protection Manual. (1984). 4th ed., 2 Vols, U.S. Army Engineer Waterways Experiment Station, U.S. Government Printing Office, Washington, DC.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	April 1998	Final report

4. TITLE AND SUBTITLE
Climatic Summary for Sandy Hook Bay, New Jersey

5. FUNDING NUMBERS

6. AUTHOR(S)
Margaret A. Sabol, Ter[illegible]rickett

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Engineer Waterways Experiment Station
3909 Halls Ferry Road, Vicksburg, MS 39180-6199

8. PERFORMING ORGANIZATION REPORT NUMBER
Miscellaneous Paper
CHL-98-2

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Corps of Engineers
Washington, DC 20314-1000

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT ***(Maximum 200 words)***

This document summarizes wave data collection activities in Sandy Hook Bay, NJ, during the period March to August 1997. The objective of this data collection effort was to provide wave information to support modeling efforts for the New York/New Jersey Harbor Dredged Material Management Plan Study requested by the U.S. Army Engineer District, New York. Wave data collection was accomplished using the Prototype Measurement Analysis System, which consists of coastal oceanographic sensors and instrumentation, communication equipment, and a relational database management system.

14. SUBJECT TERMS
Sandy Hook Bay
Spectral density plots
Time series plots
Wave data
Wave rose diagrams

15. NUMBER OF PAGES
35

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED		